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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A boundary detection method ~~for detecting a boundary between areas having different features among arbitrary adjacent areas in image data~~, comprising:

extracting feature information depending on all pixels in a unit area for each unit area of the an image data;

obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area; and

determining as the a boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different features among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 2 (Currently Amended): A boundary detection method ~~for detecting a boundary between areas having different pixel arrangements among arbitrary adjacent areas in image data,~~ comprising:

extracting image frequency information for each unit area of ~~the an~~ image data;

determining representative feature information according to the extracted image frequency information;

obtaining a difference in the representative feature information between adjacent unit areas for an arbitrary unit area; and

determining as the boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 3 (Currently Amended): A boundary detection method ~~for detecting a boundary between areas having different pixel~~

~~arrangements among arbitrary adjacent areas in image data,~~  
comprising:

extracting first image frequency information of predetermined types for each first unit area of the an image data;

defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information;

provisionally determining as ~~the~~ a boundary a first unit area whose variance from the representative feature information of an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area;

extracting second image frequency information for each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area; and

determining as the boundary a second unit area whose value based on the variance from the second image frequency information of the adjacent second unit area is at or higher than a predetermined level in an arbitrary second unit area, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than

the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 4 (Currently Amended): A boundary detection method ~~for detecting, in input image data of an original whose front image is input with a background board as its background, a boundary between the background board and the original for the input image data of an image of a part of the background board and an edge of the original input in a same color,~~ comprising:

performing a Fourier-transform on each first unit area of ~~the~~ an input image data;

extracting first image frequency information of predetermined types obtained by the Fourier-transform processing;

defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information for each of the first unit area;

provisionally determining as ~~the~~ a boundary a corresponding area on an approximate line obtained by performing line approximation on a first unit area whose variance from the representative feature information about an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area;

performing a Fourier-transform on each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area;

extracting second image frequency information of predetermined types obtained by the Fourier-transform;

defining as representative feature information a value obtained by adding a predetermined weight to each type of the extracted second image frequency information for each second unit area;

performing a Wavelet transform on the representative feature information;

performing line approximation on a second unit area whose value for each second unit area obtained by the Wavelet transform is at or higher than a predetermined level; and

determining a position on the approximate line obtained by the line approximation as the boundary, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between a background board and an original for the input image data of an image of a part of the background board and an edge of the original input in a same color is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 5 (Original): The method according to claim 4, wherein in image data in which the original is surrounded by the background board, the boundary is detected from four different directions parallel or orthogonal to each other on the image data.

Claim 6 (Original): The method according to claim 1, wherein a printing area is first designated for the image data, and image data from which the printing area is excluded is defined as a target

for detecting the boundary.

Claim 7 (Original): The method according to claim 2, wherein a printing area is first designated for the image data, and image data from which the printing area is excluded is defined as a target for detecting the boundary.

Claim 8 (Original): The method according to claim 3, wherein a printing area is first designated for the image data, and image data from which the printing area is excluded is defined as a target for detecting the boundary.

Claim 9 (Original): The method according to claim 4, wherein a printing area is first designated for the input image data, and input image data from which the printing area is excluded is defined as a target for detecting the boundary.

Claim 10 (Original): The method according to claim 1, wherein said feature information comprises a high frequency element, a low frequency element, a direct current element, and a frequency distribution.

Claim 11 (Original): The method according to claim 5, wherein when the determined boundary forms a rectangle, cant correction is performed on an area contained in the rectangle based on the boundary.

Claim 12 (Original): The method according to claim 5, wherein based on the determined boundary, one area adjacent to the boundary or an original portion of the image data is left, and the other area or a background board of the image data is removed.

Claim 13 (Original): The method according to claim 11, wherein based on the determined boundary, one area adjacent to the boundary or an original portion of the image data is left, and the other area or a background board of the image data is removed.

Claim 14 (Original): The method according to claim 5, wherein: based on the determined boundary, one area adjacent to the boundary or a background board portion of the image data is colored in black; and

a character contained in the other area adjacent to the boundary than the area colored in black is recognized.

Claim 15 (Original): The method according to claim 11, wherein: based on the determined boundary, one area adjacent to the boundary or a background board portion of the image data is colored in black; and

a character contained in an area adjacent to the boundary other than the area colored in black is recognized.

Claim 16 (Currently Amended): A computer-readable handy storage medium storing a program used to direct a computer to perform a process of ~~detecting a boundary between areas having different features among arbitrary adjacent areas in image data~~, comprising the

functions of:

extracting feature information depending on all pixels in a unit area for each unit area of ~~the~~ an image data;

obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area; and

determining as the boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different features among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 17 (Currently Amended): A computer-readable handy storage medium storing a program used to direct a computer to perform a process of ~~detecting a boundary between areas having different pixel arrangements among arbitrary adjacent areas in image data,~~ comprising the functions of:

extracting image frequency information for each unit area of ~~the~~ a image data;

determining representative feature information according to



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the extracted image frequency information;

obtaining a difference in the representative feature information between adjacent unit areas for an arbitrary unit area; and

determining as the a boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 18 (Currently Amended): A computer-readable handy storage medium storing a program used to direct a computer to perform ~~a process of detecting a boundary between areas having different pixel arrangements among arbitrary adjacent areas in image data,~~ comprising the functions of:

extracting first image frequency information of predetermined types for each first unit area of ~~the~~ an image data;

defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as

representative feature information;

provisionally determining as ~~the~~ a boundary a first unit area whose variance from the representative feature information of an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area;

extracting second image frequency information for each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area; and

determining as the boundary a second unit area whose value based on the variance from the second image frequency information of the adjacent second unit area is at or higher than a predetermined level in an arbitrary second unit area, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 19 (Currently Amended): A computer-readable handy storage medium storing a program used to direct a computer to perform

~~a process of detecting, in input image data of an original whose front image is input with a background board as its background, a boundary between the background board and the original for the input image data of an image of a part of the background board and an edge of the original input in the same color; comprising the functions of:~~

performing a Fourier-transform on each first unit area of the an input image data;

extracting first image frequency information of predetermined types obtained by the Fourier-transform processing;

defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information for each of the first unit areas;

provisionally determining as ~~the~~ a boundary a corresponding area on an approximate line obtained by performing line approximation on a first unit area whose variance from the representative feature information about an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area;

performing a Fourier-transform on each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area;

extracting second image frequency information of predetermined types obtained by the Fourier-transform;

defining as representative feature information a value obtained by adding a predetermined weight to each type of the extracted second image frequency information for each second unit area;

performing a Wavelet transform on the representative feature information;

performing line approximation on a second unit area whose value for each second unit area obtained by the Wavelet transform is at or higher than a predetermined level; and

determining a position on the approximate line obtained by the line approximation as the boundary, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between a background board and an original for the input image data of an image of a part of the background board and an edge of the original input in a same color is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 20 (Original): The storage medium according to claim 19, wherein

said program further directs the computer to realize the function of detecting, in image data in which the original is surrounded by the background board, the boundary from four different directions parallel or orthogonal to each other on the image data.

Claim 21 (Original): The storage medium according to claim 16, wherein

said program further directs the computer to realize the function of first designating a printing area for the image data, and defining image data from which the printing area is excluded as a target for detecting the boundary.

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Claim 22 (Original): The storage medium according to claim 17,  
wherein

said program further directs the computer to realize the  
function of first designating a printing area for the image data, and  
defining image data from which the printing area is excluded as a target  
for detecting the boundary.

Claim 23 (Original): The storage medium according to claim 18,  
wherein

said program further directs the computer to realize the  
function of first designating a printing area for the image data, and  
defining image data from which the printing area is excluded as a target  
for detecting the boundary.

Claim 24 (Original): The storage medium according to claim 19,  
wherein

said program further directs the computer to realize the  
function of first designating a printing area for the input image data,  
and defining input image data from which the printing area is excluded  
as a target for detecting the boundary.

Claim 25 (Original): The storage medium according to claim 16,  
wherein

said feature information comprises a high frequency element,  
a low frequency element, a direct current element, and a frequency  
distribution.

Claim 26 (Original): The storage medium according to claim 20, wherein

said program further directs the computer to perform cant correction on an area contained in the rectangle based on the boundary when the determined boundary forms a rectangle.

Claim 27 (Original): The storage medium according to claim 19, wherein

said program further directs the computer to leave one area adjacent to the boundary or an original portion of the image data, and remove the other area or a background board of the image data based on the determined boundary.

Claim 28 (Original): The storage medium according to claim 19, wherein

said program further directs the computer to perform the functions of:

coloring one area adjacent to the boundary or a background board portion of the image data in black based on the determined boundary; and

recognizing a character contained in an area adjacent to the boundary other than the area colored in black.

Claim 29 (Currently Amended): An image processing device ~~for detecting a boundary between areas having different features among arbitrary adjacent areas in image data,~~ comprising:

a feature emphasis unit extracting feature information depending on all pixels in a unit area for each unit area of the an

image data; and

a boundary determination unit obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area, and determining as the boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different features among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 30 (Currently Amended): An image processing device ~~for detecting a boundary between areas having different pixel arrangements among arbitrary adjacent areas in image data,~~ comprising:

a feature emphasis unit extracting image frequency information for each unit area of the a image data; and

a boundary determination unit determining representative feature information according to the extracted image frequency information, obtaining a difference in the representative feature information between adjacent unit areas for an arbitrary unit area,

and determining as ~~the~~ a boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 31 (Currently Amended): An image processing device ~~for detecting a boundary between areas having different pixel arrangements among arbitrary adjacent areas in image data,~~ comprising:

a feature emphasis unit extracting first image frequency information of predetermined types for each first unit area of ~~the~~ an image data;

a boundary provisional determination unit defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information, and provisionally determining as ~~the~~ a boundary a first unit area whose variance from the representative feature information of an adjacent first unit area is at or higher than a predetermined



level in an arbitrary first unit area; and

a boundary determination unit extracting second image frequency information for each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area, and determining as the boundary a second unit area whose value based on the variance from the second image frequency information of the adjacent second unit area is at or higher than a predetermined level in an arbitrary second unit area, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different pixel arrangements among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 32 (Currently Amended): An image processing device for ~~detecting, in input image data of an original whose front image is input with a background board as its background, a boundary between the background board and the original for the input image data of an image of a part of the background board and an edge of the original input in a same color,~~ comprising:

a feature emphasis unit performing a Fourier-transform on each first unit area of ~~the~~ an input image data, and extracting first image frequency information of predetermined types obtained by the Fourier-transform processing;

a boundary provisional determination unit defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information for each of the first unit area, and provisionally determining as the a boundary a corresponding area on an approximate line obtained by performing line approximation on a first unit area whose variance from the representative feature information about an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area; and

a boundary determination unit performing a Fourier-transform on each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area, extracting second image frequency information of predetermined types obtained by the Fourier-transform, defining as representative feature information a value obtained by adding a predetermined weight to each type of the extracted second image frequency information for each second unit area, performing a Wavelet transform on the representative feature information, performing line approximation on a second unit area whose value for each second unit area obtained by the Wavelet transform is at or higher than a predetermined level, and determining a position on the approximate line obtained by the line approximation as the boundary, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between a background board and an original for the input image data of an image of a part of the background board and an edge of the original input in a same color is detected,

a target is roughly predicted with a printing area first excluded,

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and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 33 (Original): The device according to claim 32, wherein each of said units functions in four different directions parallel or orthogonal to each other on the image data in which an original is surrounded by the background board.

Claim 34 (Original): The device according to claim 29, further comprising

a printing area exclusion unit excluding a printing area of the image data from targets from which a boundary between areas having different features is detected.

Claim 35 (Original): The device according to claim 29, wherein said feature information comprises a high frequency element, a low frequency element, a direct current element, and a frequency distribution.

Claim 36 (Original): The device according to claim 32, further

comprising

an image reading unit optically reading an original and generating the image data of the original.

Claim 37 (Original): The device according to claim 33, further comprising

a cant correction unit for correcting cant of an area contained in a rectangle when the determined boundary forms the rectangle.

Claim 38 (Original): The device according to claim 32, further comprising

an image exclusion unit leaving one area adjacent to the boundary or an original portion of the image data, and removing the other area or a background board of the image data based on the determined boundary.

Claim 39 (Original): The device according to claim 32, further comprising:

an image coloring unit coloring one area adjacent to the boundary or a background board portion of the image data in black based on the determined boundary; and

a character recognition unit recognizing a character contained in an area adjacent to the boundary other than the area colored in black.

Claim 40 (Currently Amended): A copying machine ~~which provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size~~

~~of the original designated based on detection of a boundary between the background board and the original, comprising:~~

a printing area exclusion unit excluding a printing area of image information;

a feature emphasis unit extracting feature information depending on all image information in a unit area for each unit area of the an image information; and

a boundary determination unit obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area, and determining as ~~the~~ a boundary the unit area other than the printing area whose difference is at or higher than a predetermined level, wherein

the copying machine provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 41 (Currently Amended): ~~A copying machine which provides a background board on a back of an original, reads image information~~

~~about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original, comprising:~~

a printing area exclusion unit excluding a printing area of image information;

a feature emphasis unit extracting image frequency information for each unit area of the an image information; and

a boundary determination unit determining representative feature information according to the extracted image frequency information, obtaining a difference in the representative feature information between adjacent unit areas for an arbitrary unit area, and determining as the a boundary the unit area other than the printing area whose difference is at or higher than a predetermined level, wherein

the copying machine provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 42 (Currently Amended): A copying machine ~~which provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,~~ comprising:

a printing area exclusion unit excluding a printing area of image information;

a feature emphasis unit extracting first image frequency information of predetermined types for each first unit area of the an image information;

a boundary provisional determination unit defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information, and provisionally determining as ~~the~~ a boundary a first unit area whose variance from the representative feature information of an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area; and

a boundary determination unit extracting second image frequency information for each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area, and determining as the boundary a second unit area whose value based on the variance from the second image frequency information of the adjacent second unit area is at or higher than a predetermined level in an arbitrary second unit area, wherein

the copying machine provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area

corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 43 (Currently Amended): ~~A copying machine which provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original, comprising:~~

~~a printing area exclusion unit excluding a printing area of image information;~~

~~a feature emphasis unit performing a Fourier-transform on each first unit area of the an input image information, and extracting first image frequency information of predetermined types obtained by the Fourier-transform processing;~~

~~a boundary provisional determination unit defining a value obtained by adding a predetermined weight to each type of the extracted first image frequency information as representative feature information for each of the first unit areas, and provisionally determining as the a boundary a corresponding area on an approximate line obtained by performing line approximation on a first unit area other than the printing area whose variance from the representative feature information about an adjacent first unit area is at or higher than a predetermined level in an arbitrary first unit area; and~~

~~a boundary determination unit performing a Fourier-transform~~



on each second unit area smaller than the first unit area in the first unit area provisionally determined as the boundary and a vicinal area of the first unit area, extracting second image frequency information of predetermined types obtained by the Fourier-transform, defining as representative feature information a value obtained by adding a predetermined weight to each type of the extracted second image frequency information for each second unit area, performing a Wavelet transform on the representative feature information, performing line approximation on a second unit area whose value for each second unit area obtained by the Wavelet transform is at or higher than a predetermined level, and determining a position on the approximate line obtained by the line approximation as the boundary, wherein

the copying machine provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 44 (Original): The copying machine according to claim 43, wherein

each of said units functions in four different directions parallel or orthogonal to each other on the image information in which an original is surrounded by the background board.

Claim 45 (Original): The copying machine according to claim 40, wherein

a printing area of the image information is excluded based on a gray scale value.

Claim 46 (Currently Amended): An image processing device ~~for detecting a boundary between areas having different features among arbitrary adjacent areas in image data~~, comprising:

feature emphasis means for extracting feature information depending on all pixels in a unit area for each unit area of ~~the~~ an image data; and

boundary determination means for obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area, and determining as ~~the~~ a boundary the unit area whose difference is at or higher than a predetermined level, wherein

the input image data of an original whose front image is input with a background board as its background,

the boundary between areas having different features among arbitrary adjacent areas in the image data is detected,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is provisionally determined based on the feature amount obtained in a

two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.

Claim 47 (Currently Amended): A copying machine ~~which provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,~~ comprising:

printing area exclusion means for excluding a printing area of image information;

feature emphasis means for extracting feature information depending on all image information in a unit area for each unit area of the an image information; and

boundary determination means for obtaining a difference in the feature information between adjacent unit areas for an arbitrary unit area, and determining as the a boundary the unit area other than the printing area whose difference is at or higher than a predetermined level, wherein

the copying machine provides a background board on a back of an original, reads image information about the original, and outputs a copy of the original with a size of the original designated based on detection of a boundary between the background board and the original,

a target is roughly predicted with a printing area first excluded, and a variance in feature information from the adjacent area corresponding to the printing area can be ignored, then the boundary between the background board and the original is detected, and

if unit area of an image is set widely, the boundary position between the background board on the image and the original is

provisionally determined based on the feature amount obtained in a two-dimensional fast-Fourier-transform, a one-dimensional fast-Fourier-transform is performed in a unit of an area smaller than the unit area of the image, and then a Wavelet transform is performed for detecting the position of the boundary.